VIEWPOINT

EVOLVING ISSUES IN ONCOLOGY

Global Oncology

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In proposing a common *global health* definition a decade ago, the Consortium of Universities for Global Health, which includes more than 170 academic institutions and partners worldwide, emphasized moving beyond a vague, "fashionable" discipline toward a scientifically rigorous specialty that engenders international cooperation among academic health centers, government agencies, industry, and nongovernmental organizations to understand and improve health. Intrinsic to this vision is the idea that similar health disparities affect vulnerable communities in North American inner cities and African periurban shantytowns.

Substantial health disparities exist for cancer. In 2018, 59% of new cancer cases and 70% of cancer deaths occurred in low- and middle-income countries.[1] The recent emergence of global oncology as an academic discipline seeks to promote scientific and clinical advances for cancer worldwide but also may risk relegating these efforts to a small corner of academia in highly specialized journals and meetings. Indeed, it may be as appropriate to describe incremental gains in cancer control in regions where resources are relatively unconstrained as high-income–country oncology. Aside from the strong moral argument to address cancer even when it occurs outside the United States, restricting cancer care and research to high-income countries unequivocally diminishes the universe of discoveries in service of cancer patients worldwide.

The National Cancer Institute (NCI), many academic cancer centers, private foundations, and pharmaceutical companies have demonstrated interest in global oncology through myriad new programs and collaborations in low- and middle-income countries in recent years (**Table**). These initiatives often combine research, clinical care, and training to ensure sustainability. Efforts have capitalized on successes in other disease areas with a longer history of global engagement, including human immunodeficiency virus (HIV) and other infectious diseases, for which major global health initiatives have catalyzed rapid gains in life expectancy and promoted economic and political stability.[2] Although international development agencies have not historically prioritized cancer, this is now changing, particularly for cervical cancer and childhood cancers, for which the World Health Organization launched major new initiatives in 2018.

With this accumulating interest and investment, transformational opportunities lie ahead. Low- and middle-income countries provide unique translational research prospects in carcinogenesis and therapeutics, especially for infection-associated malignancies. As an example, recent integrative genomic and transcriptomic characterization of children with Burkitt lymphoma in Africa and North America demonstrated molecular features largely driven by the presence or absence of Epstein-Barr virus (EBV) rather than geographic location.[3] Analogous efforts are ongoing for other cancers with proven or postulated infectious etiologies (eg, Kaposi sarcoma and conjunctival squamous cell carcinoma), which importantly must be undertaken within cohorts or trials that ensure participants have access to appropriate standards of care.

Low- and middle-income countries can also be accelerators for developing new technologies for cancer screening, diagnosis, prognosis, and treatment monitoring such as visual inspection with acetic acid for cervical cancer screening. Efforts to improve on visual inspection have added automated visual evaluation of cervical images taken by a fixed-focus camera using a deep learning algorithm, an approach that outperformed conventional cytology at identifying precancer or cancer,[4] and might help address the limited scalability of cervical cytology in countries of all resource levels. Innovative data systems, like OpenMRS, have also been developed in low- and middle-income countries to monitor patients with HIV and tuberculosis during treatment, and provide an open-source, cost-free platform now deployed in more than 40 countries for big data science, with ongoing adaptation for new disease

Table. Representative Examples of Recent Global Oncology Initiatives Involving US Institutions

Institution Type	Examples
National Cancer Institute	Dedicated Center for Global Health established in 2011
	Expansion of AIDS Malignancy Consortium cooperative clinical trials group to include clinical trial sites in Africa and Latin America
	Intramural collaborations with low- and middle-income countries initiated by individual investigators
Cancer centers	Indiana University-AMPATH [Academic Model Providing Access to Healthcare] collaboration
	Fred Hutchinson Cancer Research Center-Uganda Cancer Institute collaboration
	University of North Carolina-Malawi Ministry of Health collaboration
	Texas Children's Hospital Global Hematology Oncology Programs of Excellence
Professional societies	American Society of Clinical Oncology international programs
	American Society of Hematology global initiatives
Industry	Novartis-Max Foundation Glivec (imatinib) International Patient Assistance Program
	Pfizer and Cipla partnering with American Cancer Society and Clinton Health Access Initiative to increase access to essential chemotherapy agents in Africa

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areas like oncology.[5] Similarly, a novel mobile health system is supporting a 5-country study involving 2000 women with breast cancer in Africa to better understand cultural, patient, and health system drivers of poor outcomes.[6] These developments provide a foundation for increased application of artificial intelligence and mobile health solutions to inform diagnostic and therapeutic decision-making.

In addition to improvements in overall cancer care infrastructure, clinical trials can provide access to treatments otherwise unavailable to patients in low- and middle-income countries, while simultaneously yielding generalizable knowledge. For example, a trial among women with metastatic *ERBB2* (*HER2*)–positive breast cancer across 16 countries, primarily low- and middle-income countries, demonstrated equivalent 24-week responses for a trastuzumab biosimilar compared with trastuzumab.[7] These findings provide evidence to allow policymakers and pharmaceutical companies to work together to expand access and lower costs for this essential cancer medicine among eligible patients worldwide, analogous to previous efforts for HIV treatment. An ongoing randomized trial involving 25 000 women in Costa Rica is testing whether 1 vaccine dose is equivalent to 2 doses for preventing persistently high-risk human papillomavirus (HPV) infection,[8] which again would have important cost and coverage implications even for the United States. Recent data for pomalidomide among patients with Kaposi sarcoma supported an international validation study in Africa sponsored by the AIDS Malignancy Consortium,[9] the first NCI cooperative clinical trials group conducting multicenter therapeutic studies for cancer in the region. If successful, this could provide key evidence with global benefit for an oral, well-tolerated, noncytotoxic option for this common HIV-associated cancer.

However, even the most robust new technologies and therapies will not favorably affect public health if not accompanied by strengthened human capacity, informed policies, and behavior change. Addressing a limited oncology workforce and research capacity in low- and middle-income countries is critical to future sustainability and self-sufficiency beyond clinical trials. Unprecedented, bidirectional training and team science opportunities now exist, given the increasing number of basic, clinical, and public health investigators in the United States endorsing career interests in global oncology. By supporting future oncology leaders from both high-income countries and low- and middle-income countries, opportunities are emerging to build durable networks and teams that span the globe. Examples already exist from many high-income country cancer centers engaged in such partnership with academic or clinical institutions, or ministries of health in low-income countries. These bilateral relationships are most successful when academic missions are aligned, leadership is shared, and institutional commitments are long-term. Ideally, these relationships include embedding from high-income countries personnel to low-income countries and providing extended training opportunities for personnel in low- and middle-income countries in the high-income countries. As these nascent global oncology teams mature, it seems inevitable that cancer discovery will become increasingly geographically agnostic, but it will also be essential to ensure that discoveries are equitably translated into tangible benefits for individual patients and public health. The American Society of Clinical Oncology has ongoing initiatives to facilitate exchange between oncologists in low- and middle-income countries and the United States and to support oncology workforce development in low- and middle-income countries. Because the key factors underlying global cancer disparities like high treatment costs and limited access are important issues in all countries, global oncologists working collaboratively will likely be best positioned to help address these barriers.

To confine cancer care and research to resource-rich countries is to forgo transformative scientific and educational opportunities. North American cancer centers are international leaders in patient-centered innovation, and their catchment areas need not be narrowly defined. Maximizing service to local geography and striving for global impact are not irreconcilable objectives. Low- and middle-income countries can be innovation hubs, where challenging environments inspire and test innovative solutions for cancer that can be applied worldwide. Embracing this philosophy will allow global oncology ultimately to be replaced by a perhaps more appropriate universal oncology discipline, which is not just a passing fashion but instead could represent a powerful driver of forward progress for cancer patients around the world.

ARTICLE INFORMATION

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